

of piciform families from the barbets or an ancestral group with a somewhat less-pronounced bill. Zygodactylous feet and the hole-nesting habit, taken in combination with the above, support present ornithological thought as to the unity of the order. The trait of honey guides of leading animals to bee hives seems to be part of a general parasitic complex which includes brood parasitism as well. No digestive abnormalities were noted but enzymes for wax digestion may be produced in stomach or small intestine.

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ZOOLOGY.—*Psammodesmus*, a neglected milliped genus (*Polydesmida*: *Platyrrhacidae*). RICHARD L. HOFFMAN, Clifton Forge, Va. (Communicated by H. F. Loomis.)

It is unfortunate that much of the previous work on diplopod taxonomy has been of rather poor quality. Far too often one finds himself obliged literally to revise a genus or tribe before feeling safe in placing an undescribed species. This is precisely the situation I encountered on endeavoring to place a new platyrrhacid milliped found in the collections of the U. S. National Museum. Fortunately, however, the problem has been of fairly easy resolution although depending upon some rather extensive nomenclatorial changes. Although the group directly involved is a South American one, it has been necessary to consider the entire family of the *Platyrrhacidae*. This has been made possible by the exceptionally useful treatise by Carl Attems, in *Das Tierreich*, Lief. 69, 1938. Despite the value of this reference, I believe that Attems's somewhat conservative treatment does not give proper recognition to the numerous species-groups whose characters seem clearly to be of generic level. Attems recognizes a single genus—divided into six subgenera—with the characters which I ascribe to the family *Platyrrhacidae*. (The other six genera of "*Platyrrhacidae*" treated in his monograph

are referable to the family *Euryuridae* in the sense of Pocock and Chamberlin.)

Interestingly enough, the first contribution to the systematics of the tropical American platyrrhacids, by O. F. Cook (1896), still appears to provide the most logical arrangement of the species! Cook was the first worker to break up the large widespread genus *Platyrrhacus* (*Acanthodesmus* or *Stenonia* of early writers) with the proposal of numerous generic names. His arrangement, although reasonable, was never generally accepted, and the most authoritative recent workers have reverted to the use of the name *Platyrrhacus* for the majority of the species. There are, however, within the family a great number of diverse types which, if they occurred in the temperate regions where faunas are better known, would long ago have been recognized as well-marked genera.

Cook's paper "New American *Platyrrhacidae*" (Brandtia, 1896, no. 12) included the diagnoses of nine new American genera. Four of these (*Nyssodesmus*, *Tiodesmus*, *Nanorrrhacus*, and *Rhyphodesmus*) have been recognized at one time or another by American workers. Various others were accepted

by Silvestri in his papers on the neotropical forms and one of these, *Psammodesmus*, becomes the subject of the present paper. The genus is redefined on the basis of gonopod structure and a new species is proposed. The type species designated by Cook has not been examined,¹ but the characters of the genus, as stated in Cook's description, seem to be quite adequate for at least a generic recognition. The specimens at hand keyed out readily to *Psammodesmus* on the basis of nonsexual characters; somewhat later it was found that in gonopod structure they are very close to the two species which Silvestri described in that genus in 1897.

APPLICATION OF THE NAME PLATYRHACUS

The primary difficulty involved in the systematics of the American species is the identity of the type species of *Platyrhacus*. Concerning this matter, Cook wrote (op. cit., p. 51):

The genus *Platyrhacus* was based by C. L. Koch on a Brazilian species, *Polydesmus scaber* Perty, or at least on a specimen so determined, and described as being slightly convex, densely granulate, and with a row of distinct, pearl-like tubercles along the posterior margin of each segment. There are said to be two other rows of somewhat smaller tubercles placed wider apart. Although the carinae are said to be strongly toothed, they appear from the plate that the teeth are broad and rounded. After studying the description in connection with that of another American species described by Koch, *Platyrhacus rufipes*, the opinion has been gained that it would not be safe to identify it, even generically, with any of the material which has come into my hands for study.

Since no types of Koch's species have ever been found, to my knowledge, and since it was not customary in his time to designate and retain type specimens, it seems to me that some sort of arbitrary action may be needed to resolve the matter satisfactorily. About the only tangible information for a starting point is the likelihood that since

Perty's original animal came from Brazil, the specimen identified as *scaber* by Koch most probably had a like provenance even though we can never be sure it was even congeneric with Perty's species.

If *Platyrhacus* as used by Attems is to be divided into more natural genera, the generic name in its restricted sense must be applied to one of the South American genera. Attems disregarded this necessity in designating *Polydesmus pfeifferae* Humbert and Saussure, 1869, an East Indian species, as type of the genus.

There is a considerable number of recognizable American genera, distinguished for the most part by the structure of the gonopods. Of these genera, *Tiroidesmus* and *Aymaresmus* are disqualified, so far as application of the name *Platyrhacus* is concerned, because of the shape of the keels in those two groups. Of the remainder, it seems best to apply the name to that genus which is most numerous in species and has the widest range; and thus would be most likely encountered by early collectors. The group which most readily qualifies is that including *clathratus*, *bilineatus*, *propinquus*, *tenebrosus*, and their close relatives. It extends from Nicaragua into western Brazil. There is nothing in Koch's description and plate to preclude association of his generic name with this group (of which Cook apparently had seen no specimens—cf. the last sentence of his paragraph quoted above).

It is felt that an eventual decision regarding the identity of *P. scaber*, involving a redescription and designation of type specimens, will be desirable and necessary for a final settlement of this issue. At the present time this step can not be taken, in the lack of adequate material for study.

Should the present allocation meet with general approval, it will become necessary to select one of the numerous generic names already available for the group of Indonesian species treated by Attems in his subgenus *Platyrhacus*. Ten such names (proposed by Cook, Pocock, and Silvestri) are listed as synonyms in Attems's account. Since his "subgenus" seems clearly to be heterogeneous, it is probably advisable to delay nomenclatorial settlement until at least a partial

¹ *Psammodesmus cos* was based on a specimen lent to Cook by the Academy of Natural Sciences of Philadelphia. Dr. J. A. G. Rehn, curator of insects at that institution, informs me that it is not now in their collection and probably was not returned. I have not been able to locate it in the National Museum collection, wherein most of Cook's material was deposited.

restudy of the East Indian forms has been made.²

Genus *Psammodesmus* Cook

Psammodesmus Cook, 1896, *Brandtia*, no. 12: 52.—Silvestri, 1897, *Boll. Mus. Torino* 12 (305): 15. *Platyrrhacus* subgenus *Tiroidesmus* Attems, 1938, *Das Tierreich*, Lief. 69: 229 (in part). *Ernostyx* Chamberlin, 1941, *Bull. Amer. Mus. Nat. Hist.* 78: 497 (type, *E. moyobambus* Chamberlin).

Type species.—*Psammodesmus cos* Cook, by original designation.

Generic diagnosis.—Platyrrhacid millipedes characterized by the following combination of features: Dorsum slightly arched, keels set high on sides; lateral edges of keels almost smooth, bearing only two or three small teeth (somewhat emarginate in *moyobambus*); tergites divided into three transverse rows of poorly defined polygonal areas, each of which has a tiny median tubercle; repugnatorial pores small, removed from the edge of the keels by a distance of from 2 to 6 times the diameter of the peritreme area; collum with an anterior row of large tubercles, behind which is a distinct transverse depression.

Male gonopods with the prefemur and femur coalesced into a rather stout, straight, and unmodified trunk, terminating distally in a large flattened tibiotarsal blade and a tapering, slender solenomerite branch. The genus is especially characterized by the fact that these terminal elements are bent in a direction *away from* the coxal portion of the gonopod. The impression given is that of an arm bent at a right angle at the elbow, with the thumb and opposed cupped fingers pointing away from the shoulder. In the genus *Platyrrhacus* the tibiotarsus and solenomerite are

² Attems's treatment of the Platyrrhacidae leaves much to be desired in the way of consistency. Despite his inclination to reduce the number of supraspecific categories as much as possible, his own groupings are not always defensible. A case in point is the subgenus *Ozorhacus*, proposed in *Das Tierreich* (69: 253) for the inclusion of 10 species. As shown by the illustrations of the gonopods, none of the referred forms are closely related to the type species (*katantes* Attems). Rather, of them, *amblyodon* and *coelebs* are very close to *singulus* and *microporus*, respectively, which Attems places in the subgenus *Platyrrhacus*; *mortoni*, *postumus*, *tetanotropis*, and *sarasinorum* are allied with the group of species (particularly *mediotaeniatatus*) placed by Attems in *Psaphodesmus*. Furthermore, *fecundus* and *sterilis* on the one hand, and *arietis* on the other, cannot be allocated to any currently recognized grouping; doubtless generic names will have to be proposed for them.

bent in the opposite direction—back toward the coxa.

Synonymy.—Attems (*op. cit.*, p. 226) grouped almost all the American platyrrhacids in a subgenus to which he applied Cook's name *Tiroidesmus* (type, *fimbriatus* Peters). It is felt that this species is quite worthy of generic distinction from the other Neotropical forms (because of the characteristic shape of the lateral carinae as well as the male gonopods); *Tiroidesmus* is at present considered to be monospecific.

Chamberlin has recently described several new genera of the family from northeastern Peru. It is apparent from his paper that he did not consider the known diplopod faunas of immediately adjacent countries such as Ecuador and Brazil; furthermore the drawings given for his genus *Ernostyx* are strongly suggestive of the sort typical of *Psammodesmus*. At my request, Dr. Willis J. Gertsch very generously lent the holotype of *Ernostyx moyobambus* from the collection of the American Museum of Natural History. Examination of this specimen disclosed that it is congeneric with the new species of *Psammodesmus* to be described (cf. Figs. 4, 5), and that if my understanding of that genus is correct, *Ernostyx* must fall as a junior synonym.

Species.—Eight.

Range.—Cordilleran region of northwestern South America; from northeastern Peru to the isthmus of Panama.

Psammodesmus schmitti Loomis and Hoffman, n. sp.³

Figs. 1-4

Type specimens.—Male holotype in the collection of the U. S. National Museum; collected at Port Obaldia, Province of Darién, Panama, by H. Pittier (around 1914). Two male paratypes, also in the National Museum, from Cana, Province of Darién, collected by E. A. Goldman in June 1912.

Diagnosis.—Characterized primarily by the shape of the tibiotarsal lamina of the male gonopod. Its distal edge is gently arcuate, only slightly extended beyond the level of the solenomerite. In the other known species the distal

³ This species was recognized as new and a description was prepared by H. F. Loomis from the Port Obaldia specimen. On learning of my interest in *Psammodesmus* he kindly forwarded the specimen and his description and drawings. All these have been utilized in the above text, and it seems appropriate to consider the species as described jointly by Loomis and myself.

margin of this part is produced upwards into a pronounced angulation.

Description of type.—Body 53 mm long and 9.5 mm wide. Dorsum moderately convex; lateral carinae projecting from above the middle of the body, slightly deflexed and extending far from the sides, decidedly broader than long, anterior margin with a prominent square shoulder at the base.

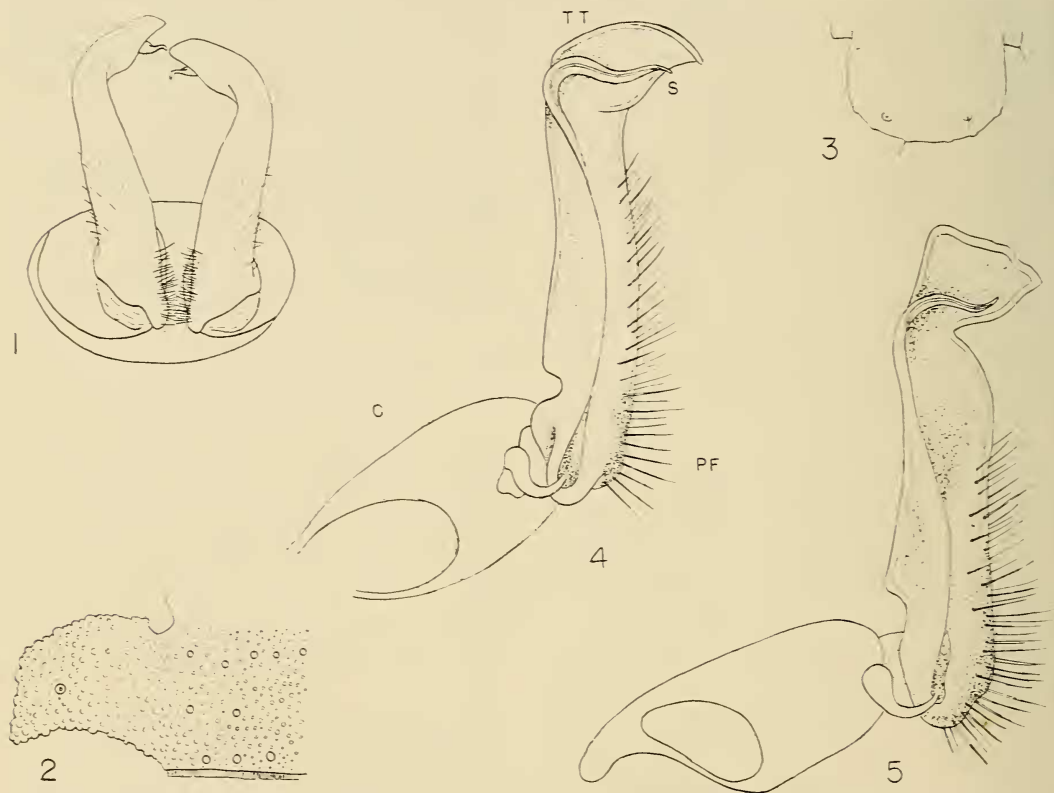
Head with the ridges of the vertex broad, tortuous, converging backward but not quite meeting at the groove; shining-coriaceous clypeal area triangular with the upper angle opposite the lower margin of the antennal sockets; remainder of surface finely tubercular. Antennae relatively long, reaching caudad to middle of the third tergite; articles sparingly hirsute, 2nd to 5th similar in size and shape, 6th very slightly longer.

Collum with the median two-thirds of the anterior margin broadly rounded, the outer sixth on each side straight and bent sharply

ectocaudad and with 6 to 8 rounded crenations or nodules; outer fourth of the posterior margin on each side slanting obliquely inward to the transverse median half. Surface of the segment densely beset with small tubercules and a row of 10 to 12 large, rounded, pearlike ones just behind the median portion of the front margin; another row of 8 to 10 similar tubercules near the posterior margin, and the disk with 8 to 10 large scattered tubercules. Behind the depression following the anterior row of tubercules the surface of the segment is raised into a reniform swelling, having the emargination in front.

Succeeding segments with the surface sculpture as on the collum, having large tubercules in a row in front of the posterior margin and scattered ones in front, except on the posterior segments where these tubercules are arranged in two rows in addition to the marginal series. On the posterior segments the smaller tubercules are much less distinct than toward the front of the body.

Lateral carinae considerably broader than



FIGS. 1-5.—1, Gonopods, in situ, of male holotype of *Psammodesmus schmitti*, n. sp., Port Obaldia, Panama; 2, lateral carina of tenth segment of same, dorsal view; 3, last tergite of same, dorsal view; 4, left gonopod of same, mesial view (abbreviations: c, coxa; pf, prefemur; tt, tibiotarsus; s, solenomerite); 5, left gonopod of male holotype of *Psammodesmus moyobambus*, Moyobamba, Peru, mesial aspect.

long, with a distinct shoulder in front just ectad of the base; posterior angles very gradually increasing in length toward the back. Nineteenth segment with the keels bent caudad and their posterior margins almost longitudinal. Pore formula normal; the pores surrounded by a broad, flat rim (peritreme); pores remote from the margins of the keels—being 4 to 7 times the diameter of the pore area from the outer margin, and 3 to 4 times its diameter from the posterior margin. In the drawing of the carina of segment 10 (Fig. 2) the pore appears about equidistant from the outer and posterior margins. However the downward slant of the carina causes a foreshortening effect and the pore is actually much more remote from the outer than from the posterior margin.

Last segment elongate-rounded; below and at the base of this dorsal production the surface on each side is produced into a distinct setiferous tubercle (Fig. 3).

Anal valves with each raised margin bearing a setiferous tubercle above, and another tubercle on the disk of each valve close to the margin below the middle.

Preanal scale with the anterior production covering a considerable portion of the ventral posterior margin of the last segment; setiferous tubercles of the posterior margin long, closely placed, divergent, the margin between them short, rounded-acute.

Ventral surfaces and legs generally very smooth and shining. Prozonites somewhat longer than metazonites. Legs attached to a small raised area that is noticeably elevated above the level of the prozonite. Spiracles opening through small rounded tubercles, one above the insertion of each leg.

Legs moderately long (apical third of third joint visible from above when legs are extended) and slender, sparingly bristled. Length of joints, in decreasing order of length, 3-6-5-2-4-1. Third joint slightly longer than the basal two. Anterior legs without processes. Tubercles of the sterna between legs 4, 5, and 6 distinctly compressed from side to side, other sterna with rounded tubercles at the bases of the legs.

Gonopods projecting from a rounded-ovate sternal aperture, the posterior margin of which is strongly elevated. Seen in ventral aspect, the gonopods (Fig. 1) appear nearly straight for two-thirds of their length, with the distal third bent at a 45 degree angle mesiad and away from the

sternites. Coxae of gonopods rather small, somewhat ovoid, without projections or large hairs. Prefemur and femur inseparable, unless the point of their coalescence is indicated by an indentation on the side near the coxa (this indentation is also present in *moyobambus*). Setose area along outer margin extends about two-thirds the length of the joint, which is robust and relatively straight. Course of seminal channel indicated by a long gently arcuate groove. Tibiotarsus represented by a large, somewhat crescent-shaped blade, the terminal end of which points away from the coxa. The distal margin of this part is arcuate, the free proximal margin concave, as shown in the drawing. Arising at the base of the tibiotarsus is a slender, unbranched, somewhat sinuate solenomerite.

After 40 years of preservation the specimen is completely bleached, and no conjecture can be made concerning the color of the living animal.

Remarks.—The two paratypes from Cana differ slightly in that sternal spines are so faint as to be easily overlooked. In them, too, the tergites show a tendency to be divided into three transverse rows of polygonal areas which are, however, perceptible only with the specimens dried. The gonopods of all three specimens are identical in every respect.

The species is named for Dr. Waldo L. Schmitt, head curator of zoology in the U. S. National Museum, in recognition of his contributions to the knowledge of Middle American Crustacea and in appreciation of his cooperation and assistance which have greatly facilitated my work at the U. S. National Museum.

THE SPECIES OF PSAMMODESMUS

Eight species are at present referable to the genus. It is a matter of some regret that males of the type species are as yet unknown; however, it is believed that *P. cos* can readily be distinguished on the basis of non-sexual characters. Another species is likewise known only from the female sex. This was described by Chamberlin (op. cit) as *Platyrrhacus cainarachus*. The description and figures given, however, agreed so well with the characters of *Psammodesmus* that the type specimen of *cainarachus* was re-examined. I am again indebted to Dr. Gertsch for making this specimen available for examination. It is clearly a species of

Psammodesmus, and very close to *moyobambus*.

In order to summarize what is now known about the genus, I subjoin a tentative key for identification of the species, and a list indicating pertinent literature and distribution.

1. Repugnatorial pores removed from edge of keel by a distance of 5 or 6 times the diameter of the peritreme.....*cos* Cook
Repugnatorial pores removed from edge of keel by a distance generally not exceeding 4 times diameter of the peritreme.....2
2. Lateral margin of midbody keels excavated or indented adjacent to the pores.....3
Lateral margins of keels not excavated or indented.....4
3. Dorsal tubercules of normal, moderate size, at most hemispherical in shape
moyobambus (Chamberlin)
Dorsal tubercules enlarged, higher than wide and very prominent
cainarachus (Chamberlin)
4. Solenomerite short, simply arcuate
chuncho (Chamberlin)
Solenomerite longer, definitely bisinuate or somewhat sigmoid in shape.....5
5. Tibiotarsus of gonopod semicircular or nearly so in shape, its inner edge straight and indented from inner edge of femur, thus exposing base of solenomerite.....6
Tibiotarsus not semicircular, its inner (or distal) margin continuous with that of femur, not exposing base of the solenomerite.....7
6. Dorsum dark brown, with the keels lighter
cameranii Silvestri
Dorsum dark gray with two paramedian longitudinal light gray stripes
fasciolatus Silvestri

7. Tibiotarsus suberescient in shape
schmitti Loomis and Hoffman
Tibiotarsus subtriangular in shape
dasys (Chamberlin)

PSAMMODESMUS

cos Cook:

Brandtia, no. 12: 52. 1896.
Colombia.

cameranii Silvestri:

Boll. Zool. Mus. Torino **12** (305): 15, fig. 41.
1897.

Ecuador: San José, Gualaquiza, San Antonio.

fasciolatus Silvestri:

Boll. Zool. Mus. Torino **13** (324): 4, fig. 6.
1898.

Ecuador: Río Peripa.

cainarachus (Chamberlin):

Bull. Amer. Mus. Nat. Hist. **78** (7): 491, figs.
116, 117, 1941.

Peru: Dept. of Loreto, Río Cainarachi.

chuncho (Chamberlin):

Bull. Amer. Mus. Nat. Hist. **78** (7): 497, fig.
197A. 1941.

Peru: Dept. of Loreto, Iquitos.

dasys (Chamberlin):

Bull. Amer. Mus. Nat. Hist., **78** (7): 497,
figs. 193-96. 1941.

Peru: Dept. of Loreto, Contayo Hills, Río
Tapiche.

moyobambus (Chamberlin):

Bull. Amer. Mus. Nat. Hist. **78** (7): 498, figs.
188-92. 1941.

Peru: Dept. of Loreto, Moyobamba, Balsapuerto Trail.

schmitti Loomis and Hoffman

Journ. Washington Acad. Sci. **43**: 301-303,
figs. 1-4. 1953.

Panama: Prov. of Darién; Cana, Port Obaldia.